Fabrication of ZnO nanowires on a wafer scale by top-down approach

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ZnO nanowires are being widely investigated for applications in electronics, optoelectronics, and sensors. For these applications, the control of the size and location of the nanowires are one of the current challenges to fabricate nanodevices. We demonstrate a photolithography-based method for fabricating sub-50 nm ZnO nanowires arrays on a wafer scale instead of the bottom-up approach. For this work, achieving conformal ZnO ultrathin film by atomic layer deposition will be key to fabrication of ZnO nanowires by edge defined lithography. The width and height of the nanowires are controlled with nanometer precision, as chip manufacturers now do. The resolution of this method is not limited by photolithography but by the thickness of the material deposited. This work will show the possibility of nanostructured applications composed of ZnO nanowires fabricated by means of lithographic technique.